

NON-PUBLIC?: N  
ACCESSION #: 8806100266

LICENSEE EVENT REPORT (LER)

FACILITY NAME: DIABLO CANYON UNIT 2 PAGE: 1 of 5

DOCKET NUMBER: 05000323

TITLE: MANUAL REACTOR TRIP AFTER DISCOVERY OF ARCING IN  
ISOPHASE BUS MOTOR  
OPERATED DISCONNECT SWITCH DUE TO HIGH RESISTANCE AT THE  
CONTACTS  
EVENT DATE: 11/07/87 LER #: 87-024-01 REPORT DATE: 06/06/88

OPERATING MODE: 1 POWER LEVEL: 98

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: DAVID P. SISK, REGULATORY COMPLIANCE ENGINEER  
TELEPHONE #: 805-595-7351

COMPONENT FAILURE DESCRIPTION:  
CAUSE: D SYSTEM: EL COMPONENT: MODP MANUFACTURER: 295  
REPORTABLE TO NPRDS: NO

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: At 1315 PST, November 7, 1987, with the unit in Mode 1 (Power Operation) at 98 percent power, a manual reactor trip was initiated when arcing was discovered in non safety related isophase bus phase C motor operated disconnect (MOD) switch. The unit was stabilized in Mode 3 (Hot Shutdown) at 1430 PST. The four hour nonemergency report required by 10 CFR 50.72 was made at 1330 PST. On Monday, November 9, 1987 a replacement MOD was obtained. The replacement switch and the switches from the unaffected phases were inspected, cleaned, lubricated, and aligned. The unit was returned to power on November 14, 1987.

The MOD failure was caused by a combination of high ambient temperature and high resistance at the contacts. The high resistance was caused by dust and hardened lubricant on the contacts and a slight misalignment of some contacts. A comprehensive preventive maintenance procedure, MP E-61.9A

"Isolated Phase Bus, And Motor Operated Disconnect Preventive Maintenance" was developed and implemented for the isophase bus MODs.

(End of Abstract)

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## I. Initial Conditions

Unit 1 was in Mode 1 (Power Operation) at 98 percent power.

## II. Description of Event

### A. Event:

At 1310 PST, November 7, 1987, with the unit in Mode 1 (Power Operation) at 98 percent power, a roving fire watch discovered arcing in the non-safety related isophase bus motor operated disconnect (EL)(MOD) area and immediately reported to the control room. Operators were immediately sent to verify the report.

At approximately 1314 PST, the operators verified the arcing to be in the isophase bus (EL)(BU). The Shift Foreman immediately initiated a fast ramp down.

At approximately 1315 PST, the operators on the scene provided the Shift Foreman with additional information on the magnitude of the arcing and the fact that the arcing was in the MOD switch. The Shift Foreman immediately initiated a unit trip.

The four-hour nonemergency report required by 10 CFR 50.72 was made at 1330 PST.

The unit was stabilized in Mode 3 (Hot Shutdown) at 1430 PST. Investigation determined that the arcing had occurred in the phase C MOD.

On Monday, November 9, 1987 a replacement was obtained for the damaged phase C MOD switch.

The replacement switch and the switches from the unaffected phases were inspected, cleaned, lubricated, and aligned under the supervision of a vendor representative.

The unit was returned to power on November 14, 1987.

B. Inoperable structures, components, or systems that contributed to the event:

None.

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C. Dates and approximate times for major occurrences:

1. November 7, 1987, 1310 PST: Fire watch discovered arcing.
2. November 7, 1987, 1314 PST: Operators confirm arcing. Shift Foreman initiates fast ramp down.
3. November 7, 1987, 1315 PST: Event Date - manual unit trip.
4. November 7, 1987, 1330 PST: Four-hour nonemergency report to the NRC as required by 10 CFR 50.72.
5. November 7, 1987, 1430 PST: Unit stable in Mode 3.
6. November 8, 1987: Removed damaged disconnect. Searched for replacement.
7. November 9, 1987: Obtained replacement disconnect switch.
8. November 10, 1987: Replacement disconnect arrived on site.
9. November 11/12, 1987: Replacement phase C disconnect was inspected, cleaned and installed. Phase A and B contacts were inspected, cleaned, and the contacts on all three phases were lubricated.
10. November 13, 1987: Alignment completed on all three phases of MOD.
11. November 14, 1987, 0213 PST: Unit 2 paralleled to PG&E grid.

D. Other systems or secondary functions affected:

None

#### E. Method of discovery:

At 1310 PST, November 7, 1987, a roving fire watch discovered arcing in the non safety related isophase bus motor operated disconnect (EL)(MOD) and immediately reported to the control room. Operators were immediately sent to verify the report. The reactor trip was manually initiated.

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#### F. Operator actions:

The appropriate emergency procedures were followed, and the unit was stabilized in Mode 3.

#### G. Safety system responses:

1. The turbine (TA)(TRB) tripped.
2. The reactor trip breakers (JC)(BKR) opened.
3. The control rod drive mechanisms (AA)(TRB) allowed the control rods to drop into the reactor (AC)(RCT).
4. Auxiliary feedwater (AFW) pumps (BA)(MO)(P) started per design.
5. Main feedwater (SJ) was isolated.

### III. Cause of Event

#### A. Immediate cause:

The Shift Foreman initiated a manual unit trip when arcing was verified in the isophase bus MOD switch.

#### B. Root cause:

No single root cause was identified for the switch failure. The major contributors of this failure were impaired contact surfaces and high system temperatures. The causal factors that were interrelated in this incident are as follows:

Maintenance did not adequately clean and lubricate the MOD.

The vulnerability of the disconnect system to high temperatures

was not recognized.

DCPP experienced high ambient temperatures during September and October, 1987.

Operations did not respond to the isophase bus duct temperature alarms because the bus duct temperature indication in the control room did not indicate an alarm condition.

The bus duct cooling fan discharge dampers may be marginal for high temperature usage.

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#### IV. Analysis of Event

In the worst credible failure of the main generator (EL)(GEN) MOD switch, with no operator intervention, a turbine trip and subsequent reactor trip would result. The turbine trip with subsequent reactor trip is a previously analyzed condition 2 event. Under the worst credible failure conditions, the MOD switch failure would have caused the loss of one of the two off-site power sources to the plant electrical system. The startup power system and all three diesel generators (EK)(DG) for Unit 2 were available throughout this event. The Unit 1 off-site power sources were not affected by this event. Thus the health and safety of the public was not affected during or after this event.

#### V. Corrective Actions

A. A comprehensive electrical maintenance procedure, MP E-61.9A, "Isolated Phase Bus, and Motor Operated Disconnect Preventative Maintenance," covering inspection, cleaning, and alignment was developed and issued for the isophase bus MODs on both units.

B. The fan discharge damper on isophase bus duct cooler 2-2 was repaired.

C. A design change to provide for automatic actuation of isophase cooling fan dampers, previously completed on Unit 2, is being completed for Unit 1 during the current refueling outage.

D. The annunciator response procedure, PK-1423, "25KV Iso Phase Bus," is being revised to stress verification of a high temperature alarm by local measurements.

#### VI. Additional Information

A. Failed components:

Motor operated disconnect switch.

Originally manufactured by H. K. Porter but is currently being manufactured by Delta-Unibus.

25000 volt, 16000 ampere self cooled or 32000 ampere forced air cooled.

H. K. Porter drawing number L-8250  
X3.

B. Previous LERs on similar events:

There have been no previous failures of the MODs on either unit.

ATTACHMENT # 1 TO ANO # 8806100266 PAGE: 1 of 1

Pacific Gas and Electric Company 77 Beale Street  
San Francisco, CA 94106  
415/973-4684  
TWX 910-372-6587

June 6, 1988

PG&E Letter No. DCL-88-149

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555

Re: Docket No. 50-323, OL-DPR-82  
Diablo Canyon Unit 2  
Licensee Event Report 2-87-024-01  
Manual Reactor Trip After Discovery Of Arcing In Isophase Bus  
Motor Operated Disconnect Switch Due To High Resistance At  
The Contacts

Gentlemen:

Pursuant to 10 CFR 50.73(a)(2)(iv), PG&E is submitting the enclosed revision to Licensee Event Report 2-87-024 concerning the manual reactor trip after discovery of arcing in the isophase bus motor operated disconnect switch due to high resistance at the contacts. This

revision is being submitted to provide additional information on the cause of this event and additional corrective actions taken to prevent recurrence.

This event has in no way affected the public's health and safety.

Kindly acknowledge receipt of this material on the enclosed copy of this letter and return it in the enclosed addressed envelope.

Sincerely,  
/s/ W. B. Kaefer for  
J. D. Shiffer

cc: J. B. Martin  
M. M. Mendonca  
P. P. Narbut  
B. Norton  
H. Rood  
B. H. Vogler  
CPUC  
Diablo Distribution  
INPO

Enclosure  
DC2-87-OP-N118  
2144S/0060K/DJH/1856

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